Overview of Physical Security Research and Development

Force Protection Industry Day

6 June 2002

Overview

- **Air Force Role in DoD Physical Security R&D**
- **Integrated Base Defense Framework**
- **Review of On-going and Potential R&D Initiatives**

DoD Approach to Physical Secu

- DoD Manages Physical Security RDT&E Funding Through the Physical Security Equipment Action Group (PSEAG)
  - Congressional Mandate Since the Late 1980's
  - OSD to Oversee a Consolidated Physical Security Equipment RDT&E Program Ensuring Interoperability & Elimination of Duplication
  - PSEAG chaired at DoD; advocates and administers RDT&E budget
  - Defined in DoD Directive 3224.3 (1989)
  - Review Service Operational Requirements
  - Pursue Critical Technologies
- Services have Assigned Focus Areas
  - Air Force RDT&E Responsibilities:
    - **Exterior Sensors and Assessment**
    - **Access Control**
    - **Tactical Systems**
  - Army – Interior Systems, Robotics, Barriers
  - Navy – Explosive Detection, Locks and Safes, Waterside
  - DTRA – Applied Research

PSEAG Evolution – Post 19

Essential Elements of Integrated Base Defense

Deceive
- Distort enemy view, mislead

Deter
- Discourage enemy action
- Make consequences clear

Anticipate
- Enemy's perspective
- Prepare accordingly

Deny
- Prevent enemy use of space and means to attack

Detect
- See all potential threats

Delay
- Slow enemy, without massive engagement

Assess
- Analyze defense effect, leverage intel

Deploy
- Rapidly mass force
- Attain positional advantage

Neutralize
- Render enemy ineffective

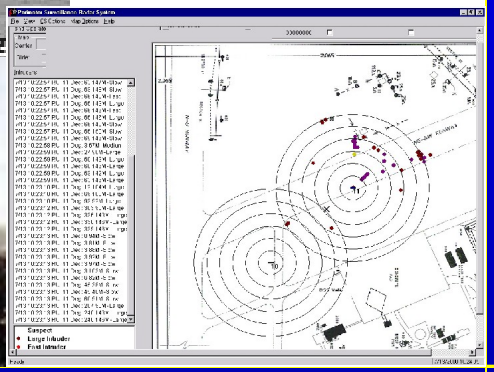
Mitigate
- Minimize enemy success

Relentless evaluation and follow-up occurs at all stages

Review of On-going and Potential FY 03 AF R&D Initiatives

Integration of Nuclear Denial Systems

Deter, Detect, Assess, Neutralize, Mitigate



Description

- Integrate sensor and assessment systems to lethal denial systems to protect resources
- Develop a seamless system that integrates detection, assessment and denial into a common picture
- Develop layered response approach
- External and internal to the igloo
- Real-time Assessment
- Maintain man-in-the-loop

Developer/Investigator

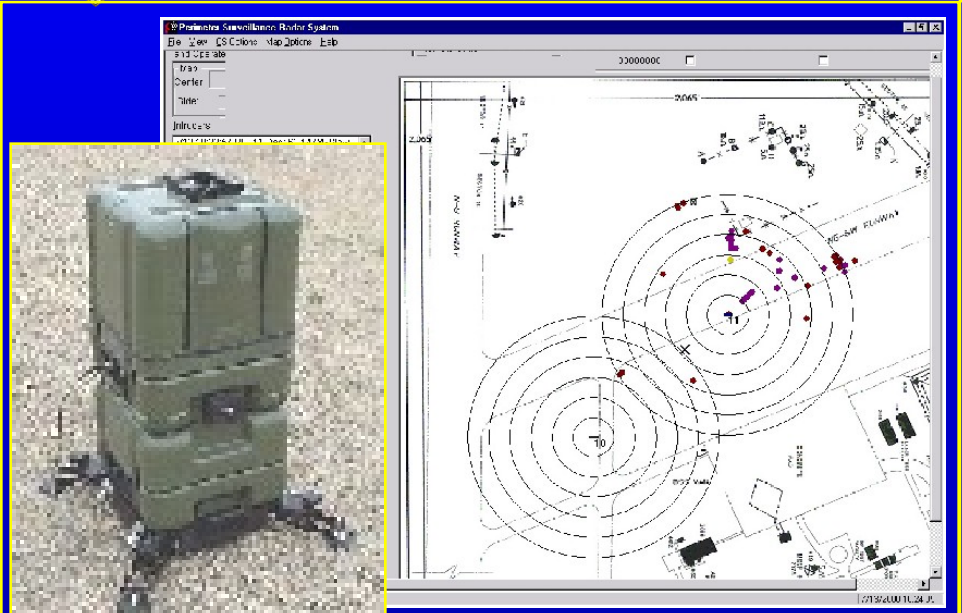
- Probable joint effort with DOE, Sandia National Laboratories (SNL), AFRL

Status

To Kick-off in FY03

Portable Surveillance Radar Sensor (PSRS)

Detect, Assess, Deploy



Description

- PSRS Is a Scanning Radar Sensor for Exterior Detection and Tracking
- Unaffected by Weather or Lighting Conditions
- Unique Capability for Operator to Program the Desired Coverage Area of up to 300 meters Radius and 360 degrees Azimuth
- Multiple Radar Sensors can be Linked to Provide Extended Coverage with a Single Display - Each Unit has GPS

Developer/Investigator

Sensor Technologies & Systems Inc (STS)
Scottsdale, AZ
POC: Mr. Walker Butler, 480-483-1997

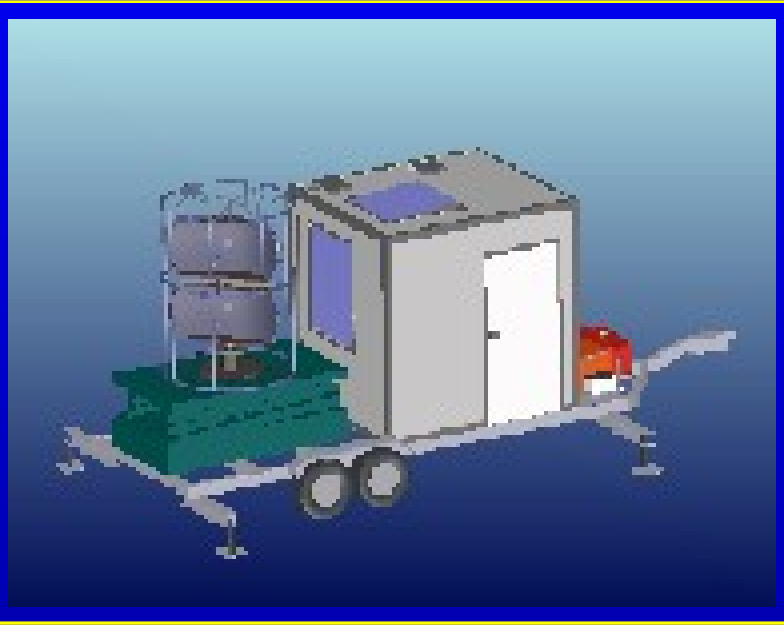
Status

- Prototype Testing Conducted
- Integrating with existing Alarm Communication and Display for an airfield perimeter application
- Objectives:
  - Integrate into nuclear and non-nuclear IBD system
  - Link with assessment system

AGENCY: ESC/FDPP
POINT OF CONTACT: Mr. Phil Resca
PHONE #: (781) 377-4126

Remote Detection & Tracking Sensor (RDTS)

Detect, Assess, Deploy



Description

- An applied research project with DTRA sponsorship to provide a long range, 360-degree sensor
  - Phase I, range feasibility
  - Phase II, build functional prototypes
- Day/night operation with line-of-sight detection
  - Detect people up to 5 km
  - Detect vehicles up to 10 km

Developer/Investigator

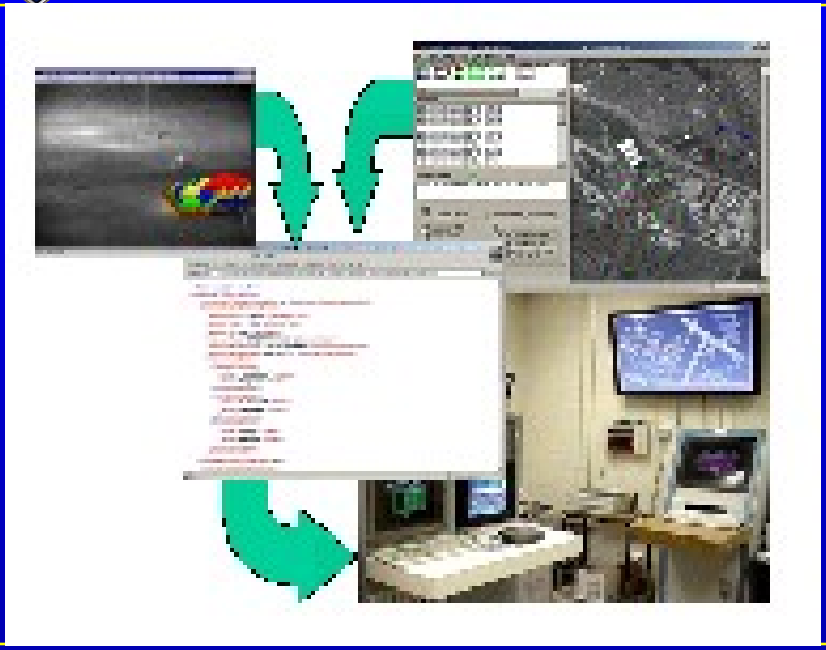
Sensor Technologies & Systems Inc (STS)
Scottsdale, AZ
POC: Mr. Walker Butler, 480-483-1997

Status

- Static range tests successful
- Prototype testing with 360 degree scanning -- Summer 02
- Objectives:
  - Integrate into nuclear and non-nuclear IBD system
  - Link with assessment system (dispersed or long range)

AGENCY: ESC/FDPP
POINT OF CONTACT: Phil Resca
PHONE #: (781) 377-4126

Integration of "Smart" Sensors



Description

- Implement Common Standards for Advanced Alarm Information
- Provides a means for incorporating varied types of sensors in a common display
  - Open up systems to " Plug and Play" wide area sensors
  - Allow sensor technologies a well defined migration path to be AF compatible
- Consider industry standardization efforts that may be applicable (e.g. Security Industry Association)

Developer/Investigator

Sandia National Laboratories
Mr. Les Cano, 505-844-5532

Projected Accomplishments - FY 03

- Complete initial task
  - Demonstrate integration
- May include additional vendors
  - Demonstrate as necessary
- Initiate follow-on task to reach final objective
  - Generic "ICD"

AGENCY: ESC/FDPP
POINT OF CONTACT: Mr. Phil Resca
PHONE #: (781) 377-4126

Long Range Assessment System

Assess, Deploy

Description

- **Research/design, develop and write specification of an optical assessment subsystem for use with wide-area sensors**
- **Procure, interface, deploy and test with long range detection system**
- **Majority of development effort applicable to developing auto-point capability for scanning sensors**

Developer/Investigator

TBD

Status

To Kick-off in FY03

- **Complete requirements analysis**
- **Develop specification**
- **Procure hardware for evaluation**

BRAID-PSI Buried Fiber Optic

Detect, Assess, Deploy

PERIMETER INTRUSION
- DETECTION
- CLASSIFICATION
- LOCALIZATION

ACOUSTIC DETECTION OF:
- FOOTSTEPS
- VEHICLE TRAFFIC
- LOW FLYING AIRCRAFT

BALLFIELD DEMO ARRAY (1000 foot)
- 300 ZONE DIVISIONS
- 13 ADAPTIVE ZONES
- GAP FREE COVERAGE
- TELEMETRY TO CENTRAL LOC.

Description

- BRAID-PSI is Blue Rose Advanced Interrogation Development for Physical Security Implementation
- Applies fiber optic and laser technology that listens to the environment for intrusions
- Currently in the applied research phase and sponsored by DTRA
- Moderate risk with high pay-off potential

Developer/Investigator

US Navy
Naval Undersea Warfare Center,
Newport, RI
Mr. Jim Donald, 401-832-6055

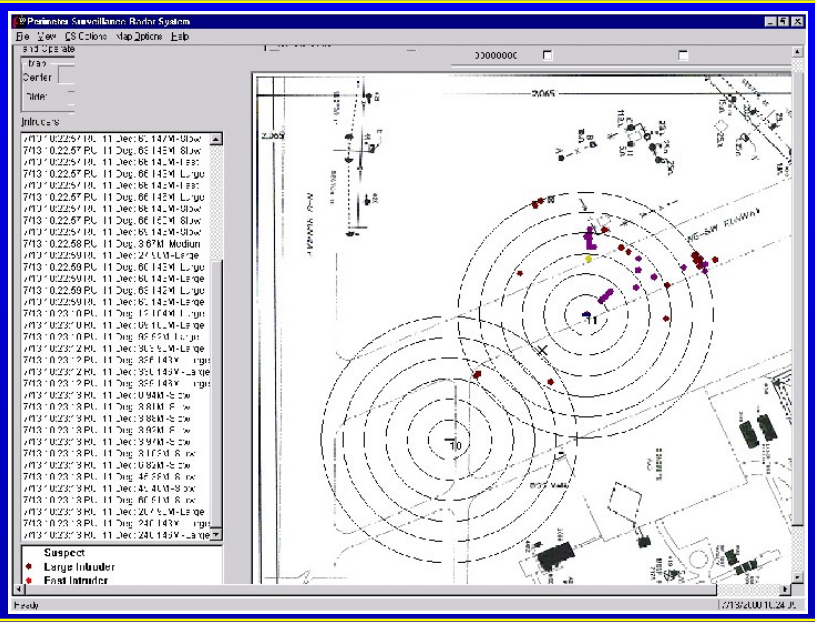
AGENCY: ESC/FDPP
POINT OF CONTACT: Mr. Phil Resca
PHONE #: (781) 377-4126

Status

- Prototype System being fabricated
- Evaluation to occur in Fall 02
- FY 03 tasks include:
  - GUI improvement
  - Algorithm writing
  - Making this a “Physical Security Sensor”

Identify and Track Friend and Foe

Detect, Assess, Deploy



Description

- Integrate wide-area tracking sensors with positional sensors (e.g. RF tags) and GPS to identify and display position of known friendly and unknown targets on a common screen.
- Enables wide-area sensors to be used in busy areas (e.g. flightlines)
- Facilitates nuclear and non-nuclear integrated base defense and weapons recapture

Developer/Investigator

TBD

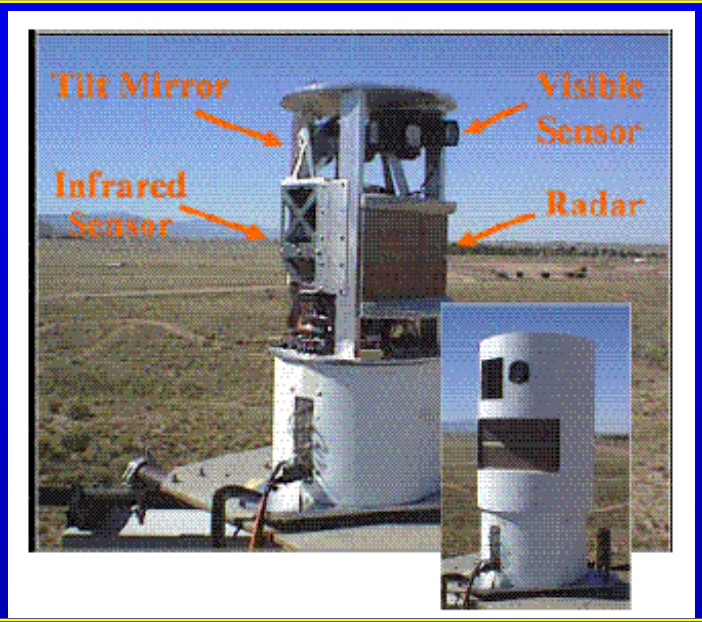
Status

To Kick-off in FY03

- Define requirement
- Research existing capabilities
- Develop and demonstrate a system that is integrated with wide-area detection

Advanced Exterior Sensor

Detect, Assess, Deploy



Description

- Integrated RADAR, CCTV, and IR 360 degree sensor
- Original development effort cancelled in FY 99 due to projected costs and schedule to overcome technical problems
- Advancements in technology, specifically processing speed, has made this viable again
- Transition from DOE lab effort to commercial vendor

Developer/Investigator

Sandia National Laboratories
Mr. Dan Pritchard, 505-844-7444

Status

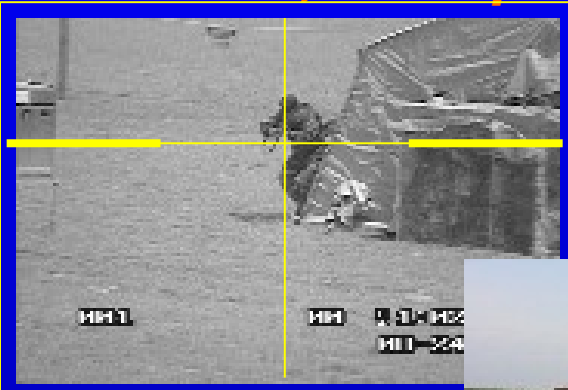
To Kick-off in FY03

Complete Phase I – 3 months
- Analysis, research & completion and demonstration of existing prototype

- Complete Phase II – 6 months
  - Manufacturing engineering of new prototype and software upgrades
- Performance
  - Crawler – 250m
  - Walkers – 500m

Remote Security Response

Deter, Anticipate, Detect, Delay, Assess, Deploy, Neutralize, Mitigate



Description

- Develop the following:
  - Suitable for exterior (WSA, LF, flightline) or interior applications (igloo)
  - Link or disengage weapon from assessment/aiming camera
    - Laser range finder for targeting
    - Camera on gun - clear line of fire
  - Network many guns with one control
  - Protect weapon from environment

Developer/Investigator

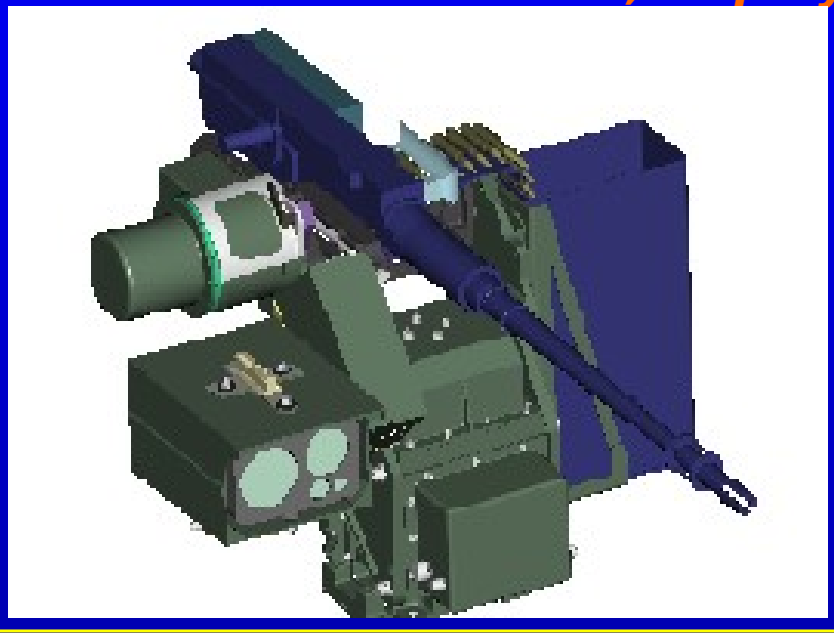
- Integration: Sandia National Laboratories
- Equipment Provider: TBD

Status

- Conceptual designs complete and modeled for impact on system effectiveness
- Objectives:
  - Install and Test Operation and control mechanisms
- Advanced development objectives:
  - Auto slew/track
  - IFF/Target recognition

Common Remotely Operated Weapon System (CROWS)

Deter, Deploy, Neutralize, Mitigate



Description

- Remotely operated weapon mount for USAF Up Armored HMMWV
  - Computer calculated firing solutions
  - Daylight CCTV, night vision, FLIR, and laser range-finder
  - Complete original effort FY 04
- Supports WSA Defenders

- Army is program lead (OPM-SA)

Developer/Investigator

US Army
Product Manager - Small Arms
Picatinny Army Arsenal, NJ
Mr. Chester Topoloski, 973-724-7412

Status

- Initial Test and Evaluation Underway
- FY03 Objectives:
  - Purchase small arms fire control system retrofit for CROWS mounting
  - Follow-on testing
  - Establish new capabilities

Remote/Standoff Explosive Detection

Deter, Anticipate, Deny, Detect

Description

- Provide detection of specifically identified explosive compounds (threshold).
- Provide explosives detection from a minimum distance of 3 meters (threshold).
- Be operationally safe (threshold).
- Detect explosives in the amount of 220 pounds (threshold) to less than TBD (goal).
- Provide detection of explosives within a stationary vehicle (threshold) to within a moving (65 miles per hour) vehicle (goal).

Developer/Investigator

Idaho National Engineering and Environmental Lab (INEEL)
Mr. Mike Occhionero, 208-526-1472

Status

INEEL Conducting in FY 02:

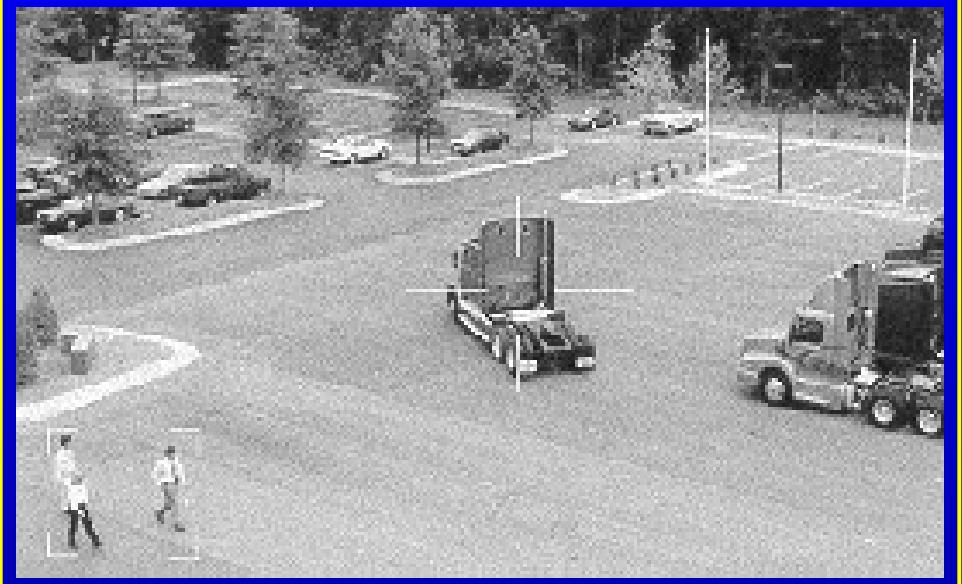
- Project Planning and Requirements
- Technology Evaluation
- Conceptual and Detail Design
- Breadboard Fabrication and testing
- Verification and Validation

Follow-on effort for FY 03:

- Complete Final Design
- Build and Test 1st Article Unit

VMD Behavior Recognition

Anticipate, Detect, Assess, Deploy



Description

- **Analyze and test the leading COTS products that are able to annunciate warnings based on particular vehicle and/or human behavior**
- **Expands the capabilities of basic VMD technology**

Developer/Investigator

TBD

AGENCY: ESC/FDPP
POINT OF CONTACT: Mr. Phil Resca
PHONE #: (781) 377-4126

Status

To Kick-off in FY03

- **Survey market**
- **Conduct tests**
  - **Evaluate any investment needs beyond COTS**
- **Complete test report**

Compact VMD with Tracking

Detect, Assess, Deploy

Description

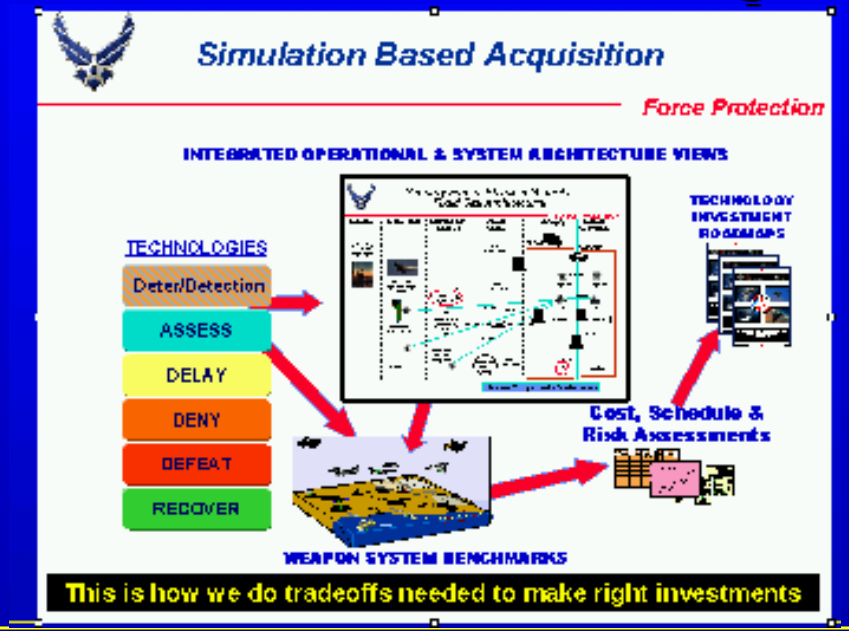
- Small VMD module
- Could apply VMD at the camera/imager
  - Conserve bandwidth by sending video data only upon alarm or inquiry
- Provides an enhanced assessment and detection capability at any existing camera for very low cost, ~$600
- Develop tracking capability
  - Automatically allows PTZ cameras to follow target
- One Product example has been informally demonstrated
- FY03 Objective – Advertise and award to:
  - Develop tracking capability
  - Formally test VMD with tracking capability

Developer/Investigator

TBD

AGENCY: ESC/FDPP
POINT OF CONTACT: Mr. Phil Resca
PHONE #: (781) 377-4126

Nuclear Force Protection Technology Modeling and Simulation



Description

- Use "Effects Based" approach to technology investment
- Model technology effects/performance parameters against battlespace benchmarks
- Determine cost, schedule, performance and risk assessments prior to acquisition
- Model tradeoffs needed to make right investments on the system

Developer/Investigator

ESC/FD led with Air Force Security Forces Center and Force Protection Battlelab coordination

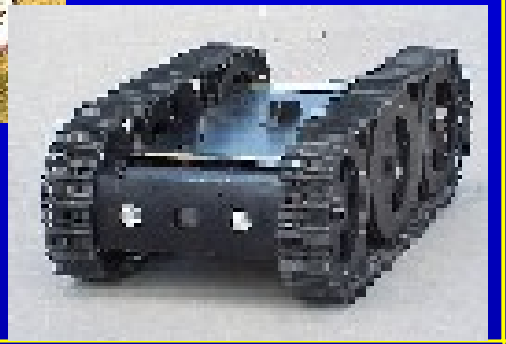
Status

FY03 Objectives:

- Stand up Modeling and Simulation capability for technology investments
- Train engineers on mod and sim technology
- Develop "Battlespace Benchmarks" needed to measure effects of systems

Robotic Response

Assess, Deploy, Neutralize, Mitigate



Description

- Collaboration effort with the Joint Robotic Program
- Integrate robot with weapon to repel/defeat intruders within a WSA

Developer/Investigator

- TBD

Status

To Kick-off in FY03

- Research potential robotic platforms
  - Controllable by SF personnel
- Integrate with WSA C2 System
- Explore weapons integration

Secure Access Fast Entry (SAFE) Gate

Deter, Anticipate, Detect, Delay, Assess, Deploy, Neutralize, Mitigate

Description

- Pilot project to incorporate advanced technology with TTPs to improve security at ECPs
- Integrate advanced technology for:
  - Personnel identification and access
  - Vehicle identification and access
  - Incorporate results in plans for deployment
- Phased approach
  - Eventually integrate with PICS

Developer/Investigator

Development underway:
Radian Inc. Newington, VA
Mr. Wayne Messner, (703) 317-2057

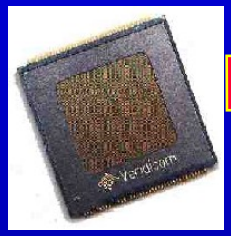
Status

Spiral I – Complete
- Integration of multiple COTS products
- Throughput/validation evaluations

- Spiral II--Incorporate lessons learned
  - Add delay/denial technology
  - Add visitor control capability - FPBL
- Subsequent spirals

AGENCY: ESC/FDP
POINT OF CONTACT: Capt Alisa Thomas
PHONE #: (781) 377-5744

Personal Identification Credential System (PICS) Follow-on



Finger Print Sensor

Description

- Credential module integrates fingerprint sensor, processor, memory, radio link & battery into a pocket-size form
- Credential activated by fingerprint of holder and communicates with access control reader
- Cannot be used by imposter
- Variety of potential applications

Developer/Investigator

EG&G Technical Services Inc.
Ms. Elaine Harlan, (505) 998-0677, x231

Status

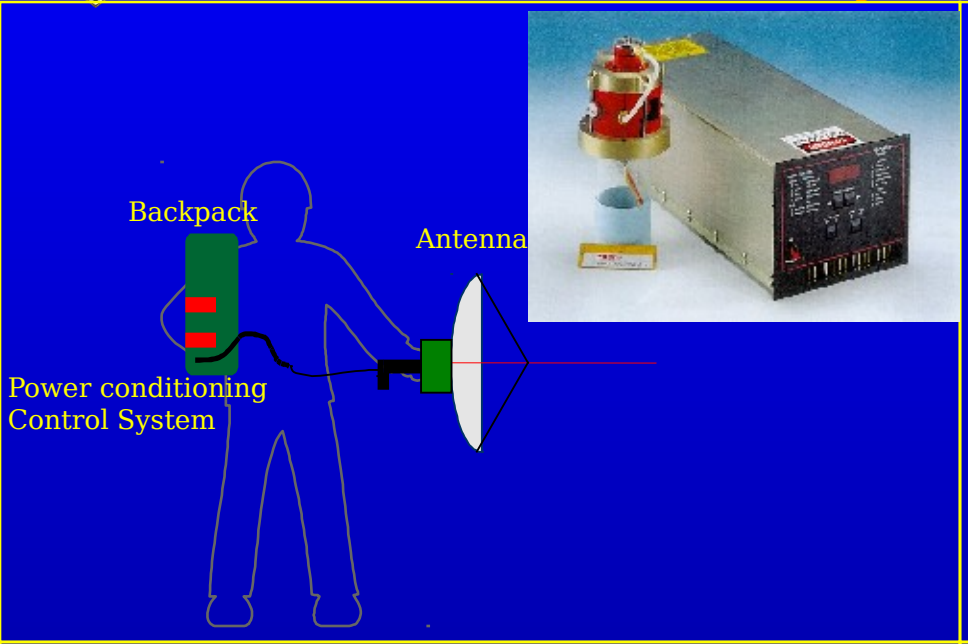
FY03 Objectives:

- Build and test 1st article units
- Potentially integrate with SAFE Gate
- Prepare for Production

AGENCY: ESC/FDPP
POINT OF CONTACT: Mr. John Meyn
PHONE #: (781) 377-3482

Small-scale Active Denial System

Deter, Delay, Neutralize, Mitigate



Description

- Develop a hand-held, close range (10s of meters) non-lethal weapon to repel and/or control personnel.
- Pain is induced in outer 1/64” skin thickness. Safety and legal issues already being addressed under the ADS ACTD.
- Uses demonstrated 100 W output extended interaction klystron (EIK) during first year of the program. Technology can be extrapolated to 1000 W lightweight devices.

Developer/Investigator

- AFRL
  Dr. Kirk Hackett, (505) 846-5496

Status

To Kick-off in FY03

- Design hand-held system
- Fabricate 100W compact system
- Demonstrate performance
- Limited biological testing
- Design follow-on system

Aircraft Self-Protection Security System
(ASPSS)

Detect, Assess, Deploy

Description

- K Band Radar for Detection of Incursions to >60m for crawlers and >80m for walkers
  - Compact Size and Weight; ~1lb
- Rugged PDA type annunciator/ configuration device with wireless comm
- Primary use for fly-away kit with aircraft
- Dual-use potential as boundary tactical sensor

Developer/Investigator

- Raytheon, Sudbury, MA
  Mr. Mark Kampf, (978) 858-1545

Status

- Prototype sensor delivered Feb 02
- Complete Phase II effort to deliver a system for evaluation
- Award Phase III effort
  - Correct any deficiencies
  - Prepare for Production

AGENCY: ESC/FDP
POINT OF CONTACT: Mr. Gunars Vinkels
PHONE #: (781) 377-4313

Remote Sensing

Anticipate, Deny, Detect, Assess, Deploy

Description

- **Provides capability to detect and assess activities in remote/blind areas**
- **Provides stand-off detection and assessment capability beyond line-of-sight**
  - **MANPAD threats**
  - **Beyond the hill**
  - **Within and beyond thick vegetation**
  - **Remote airfield**
  - **Logical paths of approach**

Developer/Investigator

- **TBD**

Status

To Kick-off in FY03

- **Research potential solutions and rank against postulated threats**
- **Test COTS as appropriate**
- **Develop as necessary**

UAV Sensor Payload Developments

Detect, Assess, Deploy

Description

- **Improve capabilities of sensor packages for fielded and planned UAVs**
  - **Resolution of on-board sensors**
  - **Ground-based imagery post-processing**
  - **C2 integration**

Developer/Investigator

- **TBD**

Status

- **Sub-tactical UAV procurement and testing underway – Payload effort to:**
  - **Continue investigating into very small, high resolution thermal imagers/infrared cameras**
  - **Investigate ground-based image processing and manipulation capabilities**
    - **Electronically enhance image**
    - **Improve transmission range**

Man-portable Delay/Denial Laser

Deter, Delay, Neutralize, Mitigate

Description

- Man-portable, dual wavelength, non-lethal prototype laser system
- To accomplish area denial through "repel" of adversary
- No external support equipment needed
- Leveraging on-going AFRL Project, "Portable Efficient Laser Testbed (PELT)"

Developer/Investigator

AFRL
Mr. Steve Alejandro (505) 846-4401

Status

- AFRL Accomplishments:
  - Both visible and IR lasers have passed initial performance tests
  - Efficient electronics designed/ built
  - Miniaturization of systems to keep package compact and lightweight
- FY03 Objectives:
  - Lab tests to validate key laser parameters

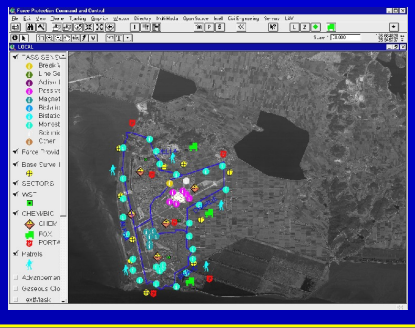
TASS P3I Program

Deter, Deny, Detect, Delay,Assess, Deploy, Neutralize, Mitigate

Assessment

Wide Area Sensors

Tactical Sensors



Description

- Continue to develop improvements to TASS
- Make it more than “just a tactical” system
  - Develop a “smart” annunciator to take advantage of the “smart” sensors
  - GIS map-based situation awareness and information sharing capability
    - Receive inputs from all sensors and assessments devices
    - Provide an integrated picture to the Battle Staff & SRC

Status

- Potential development in FY 03
  - FPC2 capabilities
  - Remote Sensor Access
  - Smart Sensor Integration
  - Adaptive Architecture Development
  - Improved Communication Bandwidth
  - Improved Hardwire Integration

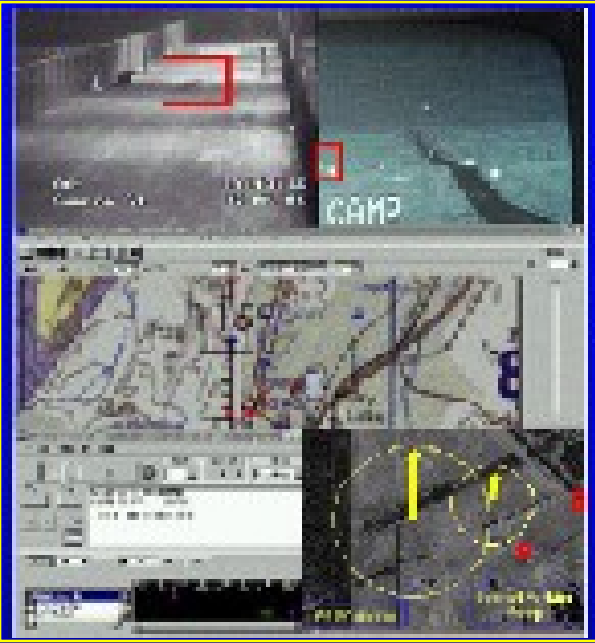
Developer/Investigator

- LAU Technologies (Curtiss Wright)
  - Chris Lablanc (978) 952-2082
- EER (L3 Comm)
  - Natesa Janakiraman (703) 375-6470
- TRW
  - Greg Madden (310) 764-6726

AGENCY: ESC/FDT
POINT OF CONTACT: Lt Jose Corella
PHONE #: (781) 377-6376

Project "Leap Ahead"

Deceive, Deter, Anticipate, Deny, Detect, Delay, Assess, Deploy, Neutralize, Mitigate



Description

- RFP to industry to demonstrate at C-3 their transformational security technologies and integrated solutions
- Provide a "leap in capability"
- Measurable effects based solutions vs compliance based
- Demonstrate integrated base defense
- Use results of our System Effectiveness Analyses to define the problem
- Encourage contractor teaming through a proven systems integrator

Developer/Investigator

TBD

Status

- Introduce/define project based on effects based philosophy
  - Encourage vendor teaming and interaction

FY03 Objectives:

- Award "Leap Ahead" project
  - May be more than one winner
  - Hold demonstration at C-3
- Use results to guide future development and installation projects

AGENCY: ESC/FDPP
POINT OF CONTACT: Mr. Phil Resca
PHONE #: (781) 377-4126

Enjoy Your Visit!

The Force Protection C2 Systems Staff

Briefer: Roy A. Higgins

Chief, Advanced Technology & Planning

5 Eglin Street, Bldg 1624

Hanscom AFB, MA 01731-2100

781-377-5657